

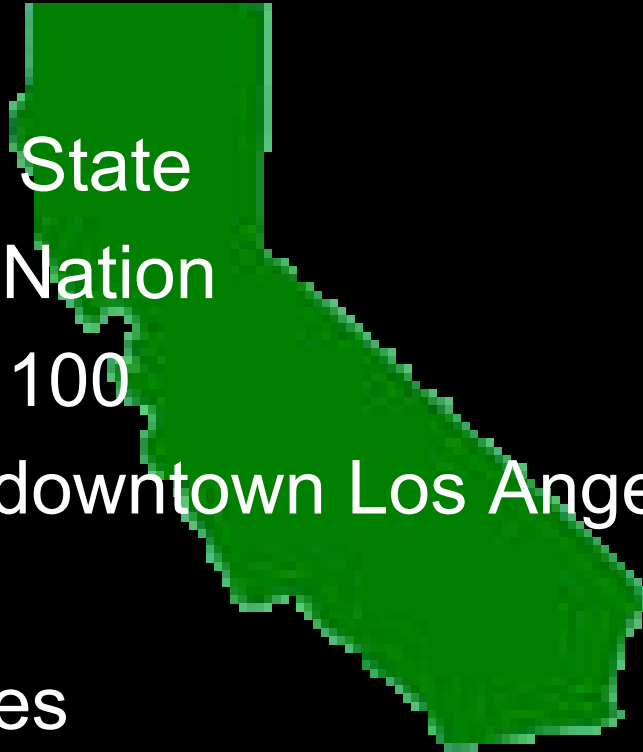
City of Long
Beach

Long Beach
ENERGY



City of Long Beach

- Fifth largest in the State
- 33rd largest in the Nation
- Population of 473,100
- 22 miles south of downtown Los Angeles
- 50 square miles
- 11 miles of beaches



Home of...



Queen Mary



Aquarium of the Pacific



Carnival Cruise Ship Terminal



Celebrated Convention Center



Long Beach Grand Prix



Port of Long Beach

International Airport

Nation's largest municipally owned Marina

Golf capitol of Southern California (5 public courses)

City of Long Beach Fleet

- 1900 Vehicles
 - ◆ Police
 - ◆ Fire
 - ◆ Light-duty
 - ◆ Heavy-duty
 - ◆ Construction
 - ◆ Tow trucks

Refuse Fleet

- 33 Side-loaders
- 36 Rear-loaders
- 4 Roll-off trucks
- 15 Support vehicles

Refuse Collection Conditions

- Old narrow streets
- Narrow alleys
- Long routes (10 hr. days)
- Steep grade to dump site (SERRF)

Alternative Fuel Vehicle Program

- Built four (4) public access CNG stations
- Equipped facility to repair CNG vehicles
- Purchased and deployed CNG vehicles
- Actively participate in AFV conferences
- Hosted recent Fire Marshal's Conference on Permitting AFV Stations

AFV Program Accomplishments

- Received first Clean Cities Award from Department of Energy in 1994 – Leader in Improving Air Quality
- Nations first fleet of dedicated LNG street sweepers - 2003

Alternative Fuel Vehicles

- 300 CNG vehicles
 - ◆ Sedans
 - ◆ Pick-up trucks
 - ◆ Vans
 - ◆ Refuse trucks
 - ◆ Roll-off Container Trucks

Our Experience

- Engine Conversions
- Early dual fuel (CNG/diesel)
- Factory (OEM) dedicated
- Concerns:
 - ◆ Power
 - ◆ Engine failures
 - ◆ Technical support
- CNG suitable for light and medium-duty
- Not practical for heavy-duty
 - ◆ Multiple tanks
 - ◆ Tank mounting
 - ◆ Payload losses
 - ◆ Range issues
 - ◆ Increased refueling (2-3 times per day)

Alternative Fuels Mandate

- New AQMD standards prohibit use of diesel
- AQMD says standards safeguard public health
- Rules apply to public and private fleets

LNG - Widely Accepted

LNG has emerged as the alternative fuel of choice for heavy-duty vehicles

- Transits
- Refuse Collection Industry
- Grocery Industry
- Return-to-base fleets
- Approximately 1,477 LNG heavy-duty vehicles are currently operating or planned in California (Arthur D. Little Report)

LNG - Our Choice

- Pending Deliveries
 - ★ 29 LNG automated side-loaders
 - ★ 4 LNG roll-off container trucks
 - ★ 20 LNG street sweepers
- Engines
 - ★ Cummins Westport
 - 8.3L trucks
 - 5.9L sweepers

Liquefied Natural Gas

Practical alternative fuel for heavy-duty vehicles

- Provides range comparable to diesel
- Requires one-tank like diesel, unlike CNG
- Engine performance consistent
- Economical, averaging 65-75 cents per gallon
- Safe, as a motor fuel
- Expected to become dominant fuel choice for next 15 years

LNG – Required Investments

- Truck Delta – \$30-\$40,000 more than diesel
 - ◆ Engines, Tanks, Fuel systems
- Special refueling stations
 - ◆ Portable lease – 5400 gal - \$8,000 month
 - ◆ Permanent station
 - ★ 15,000 gal - \$650K
 - ★ 40,000 gal - \$1.2 million
- Facility modifications
 - ◆ Methane detection
 - ◆ Alarm
 - ◆ Ventilation system
- Shop equipment
 - ◆ LNG transfer system
- Training

LNG - Industry Concerns

- Fuel tanks
 - ◆ Loss of vacuum
- Fuel delivery system leaks
 - ◆ Lines and regulators
- Increased maintenance costs
- LNG Supply

LNG Supply

One supplier delivers most LNG to Southern California

El Paso/ALT Topock, AZ	86,000 GPD	284 mi. from Los Angeles
ExxonMobil Shute Creek, WY	70,000 GPD	858 mi. from Los Angeles
Williams Ignacio, CO	50,000 GPD	847 mi. from Los Angeles
BP-Amoco Evansont, WY	30,000 GPD	760 mi. from Los Angeles

Liquefaction Technology

- Traditional pipeline LNG
- Landfill gas to LNG
 - ◆ Technology exist
 - ◆ AQMD embracing
 - ★ Minimize flaring
 - ★ Bridge LNG supply gap
 - ★ Funding

Hybrid Electric Technology

- Transits
- Heavy-duty trucking
- DOE push to develop heavy-duty hybrids
- Oshkosh Truck receives \$5 million
 - ◆ Defense trucks
 - ◆ Refuse hauling